DRAFT

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
PRATT & WHITNEY
EAST HARTFORD, CONNECTICUT
EPA ID No. CTD990672081

Prepared for:

PRATT & WHITNEY
A UNITED TECHNOLOGIES COMPANY
400 Main Street
East Hartford, Connecticut 06108

Prepared by:

LOUREIRO ENGINEERING ASSOCIATES, P.C.
100 Northwest Drive
Plainville, Connecticut 06062

LEA Comm. No. 68V8124

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1. INTRODUCTION

Loureiro Engineering Associates, P.C. (LEA) was retained by Pratt & Whitney (P&W) to conduct a voluntary subsurface investigation at a portion of the P&W facility located at 400 Main Street (Main Street facility) in the Town of East Hartford, Connecticut. The portion of the Main Street facility addressed in this summary report is known as the Airport/Klondike Area (hereinafter referred to as the Site). The subsurface investigation at the Site was undertaken on a voluntary basis pursuant to Section 22a-133x(b) of the Connecticut General Statutes (CGS). It should be noted that Section 22a-133x of the CGS was recently codified and was formerly known as Section 3 of Public Act (PA) 95-183.

The activities at the Main Street facility are also subject to a Voluntary Corrective Action Program (VCAP). On July 17, 1996, P&W and the United States Environmental Protection Agency, Region 1 (EPA-New England) signed a Memorandum of Understanding (MOU) that outlines the principle components of the VCAP. P&W's principal objective, as discussed in the MOU, is to have initiated stabilization activities at the Main Street facility on or before December 31, 1999. With P&W's desire to transfer the Airport/Klondike portion of the Main Street facility in the near future, the Airport/Klondike Area is being taken to final remediation at this time.

Pursuant to Section 22a-133x(a) of the CGS (formerly Section 3(a) of PA 95-183), P&W is going to submit an Environmental Condition Assessment Form (ECAF) to the State of Connecticut Department of Environmental Protection (DEP). P&W is completing and submitting the ECAF in support of the intention to perform the investigation and, as necessary, the remediation of the Site under the direction of a Licensed Environmental Professional (LEP) pursuant to Section 22a-133x(b) of the CGS.

Preliminary discussions held with the DEP have indicated that the voluntary investigation and remediation of the Site could be conducted pursuant to Section 22a-133x(b) of the CGS. The provisions of Section 22a-133x(b) allow for the investigation and remediation of a site under the direction of an environmental professional licensed pursuant to Section 22a-133v(e) of the CGS. It should be noted that Section 22a-133v was recently codified and was formerly known as Section 4(e) of PA 95-183. This report provides documentation of the site characterization investigations that have been performed to characterize the nature and delineate the extent of contamination identified on the Site, documentation of the remediation activities that have been

conducted, and relevant information necessary to verify that the investigation and remediation have been performed in accordance with prevailing standards and guidelines.

1.1 Background

The P&W Main Street facility is located on over 960 acres with over 6.5 million square feet of floor area for manufacturing, research, office space, and space for related activities and support services. The Main Street facility has been used for the manufacture of aircraft engines and aircraft engine components since December 1929. Operations at the facility include (or have included in the past) metal parts machining, vapor degreasing, chemical etching, cleaning, electroplating, painting, assembly and testing, and research operations.

To the east of the main complex of the Main Street facility lies the Airport/Klondike Area consisting of the Rentschler Field and an area known as the Klondike. The Airport/Klondike Area was used for experimental test operations as well as ancillary support operations for the main complex. This approximately 600 acre Airport/Klondike Area is the Site as addressed in this report.

1.2 Goals and Objectives

The primary objective of the subsurface investigation was to determine whether or not there has been a release(s) to soil or groundwater due to activities conducted at the Site, and if a release is identified, to determine if remediation is required. Therefore, the subsurface investigations were conducted in a manner that would support evaluation of the need for remediation in accordance with the requirements of the Connecticut Remediation Standard Regulation (Sections 22a-133k-1 through 22a-133k-3) of the Regulations of Connecticut State Agencies (RCSA).

The subsurface investigation was designed to provide sufficient information to characterize the nature and delineate the extent of contamination detected on the Site. To achieve the stated goal and objectives, the subsurface investigation was conceived to include both environmental setting and contaminant delineation investigations. The objective of the environmental setting activities was to develop a site-wide understanding of environmental conditions in soils and groundwater, particularly in the context of how those conditions might affect the fate and transport of potential contaminants. The environmental setting investigations were also designed to characterize the unconsolidated materials in terms of physical characteristics to define the stratigraphy and soil properties of both the saturated and unsaturated zones across the Site.

The objective of the contaminant delineation investigation was to define the nature, and delineate the extent of soil and groundwater contamination at the Site. The contaminant delineation investigation was designed to include both initial and focused soil sampling activities and site-wide groundwater sampling activities. The initial activities were designed to quickly evaluate larger portions of the Site and included soil vapor surveying and geophysical surveying consisting of both time-domain electromagnetic induction (TDEM) and magnetometry. The results of the initial activities were used to direct the placement of soil borings and test-pit excavations to be conducted in the focused soil sampling activities in select areas at the Site. Groundwater contamination is evaluated from a site-wide perspective due to the nature of groundwater movement and contaminant transport.

1.3 Report Organization

This summary report documents the investigation and remediation activities completed for the Airport/Klondike Area between June 1996 and June 1998, interprets the data collected, and provides conclusions derived from this data.

1.3.1 Main Document Sections and Appendices

In presenting the investigation and remediation activities completed for the Airport/Klondike Area, section discussions are followed by supporting tables, figures, and drawings. The following is a general description of the contents of each of the following sections of the report.

- Section 2 includes a summary facility description and includes pertinent background information. In addition, it contains information regarding facility operations and former investigations conducted at the Site.

- Section 3 describes the methodologies for the field investigation activities performed during the Site characterization. These activities included the performance of soil vapor and geophysical surveys, soil boring installation, monitoring well installation, the performance of test-pit excavations, and soil and groundwater sampling.

- Section 4 describes the methodologies for the management, documentation, and presentation of the data collected as part of the investigation and remediation activities.

- Section 5 presents the results of the environmental setting investigations conducted at the Site. In addition, it details the environmental setting of the Site and includes

discussions of the site-specific geologic and hydrogeologic conditions encountered and of regional geologic and hydrogeologic conditions as derived from available published information.

- Section 6 presents a site-wide overview of the soil and groundwater analytical results obtained during the contaminant delineation investigations.
- Section 7 provides an evaluation of the soil and groundwater data against the applicable numeric criteria established pursuant to the Remediation Standard Regulation (RSR).
- Section 8 presents the remediation activities that were conducted at the site to satisfy the RSR.
- Section 9 presents a summary of the findings of the investigation and remediation activities performed to date and conclusions.

1.3.2 Tables, Figures, and Drawings

To maintain the readability of this report and to prevent the numerous tables and figures from interfering with the flow of the text, all of the tables, figures, and drawings have been placed after the final text sections of the main body of the report. Table and figure groupings are marked with dividers so readers can easily refer to them when necessary. Supporting documents, including daily field reports, analytical data, boring logs, well completion logs, and geophysical investigation reports can be provided under separate cover.

1.3.3 Unit-Specific Technical Memoranda

Technical Memoranda that present the results of soil sampling and analysis in the vicinity of specific environmental units that were investigated as part of the Site investigation activities have been prepared to aid in the identification and evaluation of sources or potential sources of contamination at the Airport/Klondike Area of the P&W Main Street facility. These Unit-Specific Technical Memoranda (USTMs) include pertinent background information for each of the environmental units for which a subsurface investigation was conducted. USTMs were also prepared for those units that did not warrant a subsurface investigation.

The investigations were not intended to specifically address the occurrence of contamination in groundwater. Groundwater contamination is evaluated from a site-wide perspective due to the nature of groundwater movement and contaminant transport. However, to provide a

comprehensive presentation of the available information, a summary of groundwater information is included in the USTMs. Additional information concerning the USTM organization and conventions is included in a separate introduction for the USTMs.

As applicable, each USTM includes the rationale for conducting any investigation activities at that location, an outline of any investigation that was performed, analytical results from the investigation, and any conclusions based on the data collected. In cases where remediation activities were conducted, each USTM also includes the rationale for conducting any remediation activities at that location, an outline of any remediation activities that were performed, the analytical results upon completion of the remediation activities, and conclusions based on the data collected.

1.3.4 Activity Technical Memoranda

Technical Memoranda (TMs) describing investigation or remediation activities that were undertaken as part of the Site investigation and remediation have been included as part of the report to document those activities in greater detail than would be feasible in the main body of the report. In all, four TMs have been prepared. The titles are noted below:

- TM 1, *Monitoring Well Installation and Development and Soil Sampling*
- TM 2, *Water Level Measurements*
- TM 3, *Groundwater Sampling and Quality*
- TM 4, *Background Soil Data*

These TMs have been presented in several separate volumes following the main body of the report and the volumes containing the USTMs.

2. BACKGROUND INFORMATION

The intent of this section is to provide the reader with an overview of the Site background information. This section provides background information pertinent to the Site and includes information on the Site location, a description of operations conducted, and a discussion of the layout of the Site.

2.1 Site Location and Description

The Pratt & Whitney (P&W) Main Street facility is located on over 960 acres with over 6.5 million square feet of floor area for manufacturing, research, office space, and space for related activities and support services. The facility has been used for the manufacture of aircraft engines and aircraft engine components since December 1929. Operations at the facility include, or have included in the past, metal parts machining, vapor degreasing, chemical etching, cleaning, electroplating, painting, assembly and testing, and research operations.

To the east of the main factory complex of the Main Street facility lies the Airport/Klondike Area consisting of the Rentschler Airport and an area, known as the Klondike, formerly used for experimental test operations as well as ancillary support operations for the main factory complex. This approximately 600 acre Airport/Klondike Area is the Site as addressed in this report.

The Main Street facility is bordered on the north by a residential neighborhood and Silver Lane, on the south by a residential neighborhood and Brewer Street, on the west by Main Street and a residential area, and on the east by a residential area and Penney High School. A topographic map of the site was prepared from portions of the Glastonbury, Hartford-North, Hartford-South, and the Manchester United States Geologic Survey (USGS) 7.5 minute topographic maps and is included as Figure 1. A site plan of the entire facility is provided as Figure 2. Figure 2 also indicates the Airport/Klondike Area which is the focus of this report.

Willow Brook runs through the north end of the complex in an east to west direction toward the Connecticut River. The brook is dammed and ponded in the vicinity of the Centralized Waste Storage & Transfer Facility (CWS&TF) located within the Main Street facility. The United Technologies Research Center (UTRC) (EPA ID No. CTD095532131), through which a portion of Willow Brook passes, is located on the north central border of the Main Street plant and does not constitute part of the Main Street facility.

Overall, the Main Street facility has been divided into 26 study areas. Of these study areas, the 4 areas that encompass the Airport/Klondike Area include the North and South Airport Areas and the North and South Klondike Areas as shown on Drawing 1. Within the 4 study areas addressed in this report, there are a total of 24 sub-areas. Within the 24 sub-areas, there are a total of 104 environmental units that are described in 63 Unit-Specific Technical Memoranda (USTMs). A complete listing showing the study areas, the sub-areas, the environmental units, as well as the breakdown of the USTMs is included in Table 1.

2.2 Data Review

The Airport/Klondike Area has been the subject of specific investigations and included in site-wide investigations related to environmental conditions since the mid-1960's. These reports and other sources of information were reviewed in an attempt to consolidate the information and evaluate the coverage to determine the focus of future investigation and remediation activities. A listing of reports addressing investigations conducted in the Airport/Klondike Area is included in the References at the end of this report.

2.2.1 Master Files Search

Documents contained in the files of the Environment, Health and Safety Group at the P&W East Hartford facility were reviewed by Loureiro Engineering Associates, P.C. (LEA) personnel for information related to the Airport/Klondike Area. Maps, photographs, and figures which were included in the General Environmental Files were reviewed to see if they contained pertinent information related to the Airport/Klondike Area. Additional historical information, including layout drawings, was gathered from the Andrew Willgoos Gas Turbine Laboratory files and Facilities and Services files.

2.2.2 City Directory Search

A search of historical city directory records was performed by Environmental Data Resources Sanborn, Inc. (EDR) for the Main Street facility. The search did not locate any information for the facility.

2.2.3 Fire Insurance Maps

Database searches were performed to retrieve historical information available for the Main Street facility. LEA contracted with EDR to provide copies of all available fire insurance maps of the area.

The search revealed that twenty-four Sanborn® fire insurance maps were available for the general vicinity of the three P&W East Hartford facilities. Maps were available for the following years: 1903 (two maps); 1908 (three maps); 1913 (four maps); 1920 (four maps); 1927 (three maps); 1949 (three maps); and 1968 (five maps). However, the Main Street facility was never directly mapped by the Sanborn Company.

The 1903 Sanborn® maps show that the Main Street area of East Hartford was primarily a mixture of residences and tobacco sheds. The area to the northeast of the Brewer Street - Main Street intersection is labeled as "vacant".

The 1908 Sanborn® maps show that the Main Street area remained primarily a mixture of residences and tobacco sheds. The area presently occupied by a portion of UTRC and Rentschler Airport was occupied at that time by the Silver Lane Pickle Company. The area to the northeast of the Brewer Street - Main Street intersection is still labeled as "vacant".

The 1913 Sanborn® maps show that the area remained essentially the same as it was in 1908: a mixture of residences and tobacco sheds along Main Street. The 1913 maps show the Connecticut Tobacco Company offices and warehouses along Willow Street, approximately 1000 feet east of Main Street.

The 1920 Sanborn® maps show little change along Main Street in the area of the Main Street facility. A post office is shown on the northeast corner of the Brewer Street - Main Street intersection and the Connecticut Tobacco Company facility remains on Willow Street. The Silver Lane Pickle Company factory is still present.

The 1927 Sanborn® maps show that the Main Street area has remained unchanged along the eastside. However, two auto repair facilities have been established along the west side. The Silver Lane Pickle Company remains, and the post office is still shown to the northeast of the Brewer Street - Main Street intersection. A service station is shown just to the north of the post office and two gasoline tanks are indicated.

The 1949 Sanborn® maps show a general outline of the P&W buildings on Main Street. The former American Sumatra Tobacco Company offices are shown, labeled as "Pratt & Whitney Aircraft Company", and a general outline of the western edge of the main factory building appears. The power-house is shown, as is the former Hamilton Standard Propellers company building south of the main P&W factory building. The 1949 map shows the expansion of the facility including the main plant, J Building, and the hangars with ancillary buildings. There was no mapping to the east of the P&W property.

The 1968 Sanborn® maps show the Main Street facility as belonging to P&W, but no mapping was done because admittance to the facility was refused. Mapping was not done to the east, probably because of the residential nature of the area. The area previously occupied by the Silver Lane Pickle Company was marked as belonging to P&W, the Pickle Company buildings were crossed off and the notation "all buildings removed" was evident on the maps.

2.2.4 Topographic Maps

EDR also reviewed and provided historical topographic mapping for the Main Street facility. The Main Street facility lies at the intersection of four quadrangles: Hartford North, Hartford South, Manchester, and Glastonbury. EDR provided copies of most but not all historical topographic maps for the site. It should be noted that the information provided below is based solely on map comparison for the years available, and parts of the information provided may contain gaps due to incomplete mapping.

The 1952 topographic map shows the Main Street facility at its present location and the Silver Lane Pickle Company facility in the vicinity of the current UTRC building. The Manchester quadrangle was not available for this year. The 1963/1964 topographic maps show the Silver Lane Pickle Company buildings removed and the UTRC building constructed. The P&W factory complex was in place.

The 1968/1972 topographic maps show the Main Street facility unchanged since 1963/1964, and the office buildings in the Rentschler Airport were shown as constructed. There was evidence of some construction of small buildings in the Klondike Area. The 1984 topographic maps show minor construction at the airport, and additional construction in the Klondike Area. The 1992 topographic maps show some minor additions to the main factory buildings, an additional office building, some road construction, and some additional buildings in the Klondike Area.

2.2.5 Aerial Photographs

Aerial photographs of the Airport/Klondike Area were available from several sources. In addition to those on file and privately flown by P&W, aerial photographs were also on file with the State of Connecticut Department of Environmental Protection (DEP), the Connecticut State Library Archives, the United States Environmental Protection Agency (EPA), and various commercial sources.

A survey of aerial photographs available for the site was also performed by EDR. EDR's review indicated that the readily available photograph was from 1951. A color infrared photograph was

reported to be available from 1986. The origins of the photographs were not reported. The photographs are available from National Aerial Resources, Inc.

In addition, aerial photographs of the facility were taken in April 1990 by Golden Aerial Survey, Inc. in an effort to obtain an accurate topographic map of the facility. The topographic map developed based on the aerial photographs identified all buildings and roads at the facility at a scale of 1 inch equals 200 feet.

As mentioned previously, aerial photographs were contained in the master files of the Environment, Health and Safety Group. Furthermore, a record of photographs (including aerial photographs) of the Main Street facility is maintained by the P&W Photographic Services Department. A review of archive photographs from early 1930's until the present was conducted for those photographs which show the development and detail of the Airport/Klondike Area.

Aerial photographs on file with the DEP for the years of 1965, 1970, 1975, 1980, 1986, and 1990 were reviewed for those flight lines which passed over the Airport/Klondike Area. The expansion and development of the Site was clearly visible in these photographs. Between 1965 and 1970, development of the South Klondike Area consisted of the original X-307 test stand, the area of drum storage south of the Cryogenics Building, the Quonset Hut, the six storage yards in the Virgin Products Storage Area, the Contractor Storage Area, and the new control tower on the south end of the airport.

The 1975 photographs shows the lengthening of the airport runways. The 1980 photograph shows the construction of Fire Training Area A. In the 1986 photograph, the Linde Gas Plant has been replaced with the Chemical Storage Building. In general, the 1990 photograph shows lessened activity in the Klondike Area as indicated by smaller quantities of equipment and vehicles present.

Archive aerial photographs on file in the Connecticut State Library for 1934 and 1951 were reviewed for those flight lines which passed over the Rentschler Airport and the Klondike Areas. In the 1934 photograph, the airport was new and there was no development of the Klondike Area. In the 1951 photograph, the first development of the North Klondike Area was visible.

A request was made to the EPA for information regarding aerial photographs. Apparently the flight lines flown for the USGS are the same lines used by the EPA. The EPA had no specific flights over the East Hartford Area. A 1981 photograph obtained from the EPA included the Site, but did not have enough detail for use. No photographs were requested from the USGS due

to similar coverage and the amount of processing time required to fulfill the request (approximately two to three months).

Large-scale aerial photographs for 1965, 1970, and 1975 were obtained from Keystone Aerial Surveys Inc. A large-scale aerial photographs for 1980 was obtained from AeroGraphics Corporation. These photographs were at a scale sufficient to provide a great deal of detail for the majority of the Site. Overall, these photographs provided confirmation of the information obtained from the various other photographs and sources of information.

2.3 Site History and Ownership

The majority of the property on which the Main Street facility is currently located was purchased by United Aircraft Corporation, now United Technologies Corporation, from American Sumatra Tobacco Company in 1930. At the time it was purchased, the eastern portion of the property, which subsequently became the Airport/Klondike Area, was a tobacco field. Over time, additional parcels were purchased and included as part of the Main Street facility.

Rentschler Field was opened in 1931 and at that time it was an all-turf airfield. The all-turf airfield consisted of approximately 165 acres of land constructed to promote drainage and suitable for use in all weather conditions and seasons. During the initial operations, Rentschler Field had two hangars including a service hangar and an experimental hangar.

Originally created as a test field, Rentschler Field was subsequently expanded into a service center for the overhaul and maintenance of P&W engines. The airfield served as a base for experimental flight tests of airplanes, engines, and propellers. The hangars associated with the airport were used to service company-owned and customer-owned airplanes. The airport was used for scheduled flights by American Airlines in 1939 and for the flight testing of the Vought Corsair.

Construction of an airport expansion began in 1939 and was completed in 1941. In 1941, the hangars were moved more than one-half mile from an area to the west of the runways, in the approximate location of L and M Buildings within the main factory complex, to the northwest edge of the field at their present location. Coinciding with the airport expansion, the hangar size was doubled. At that time, the runways were paved and the runways extended to 3,500 feet for the north-south runway and 3,000 feet for the northeast-southwest runway. The expansion of the airport also included the construction of a control tower, the construction of an experimental laboratory, and offices. The majority of these construction activities were completed to the west and off the Site.

P&W's Airport Division cooperated in the war program by overhauling engines in service to the United States (U.S.) Armed Forces, the British Air Commission and other major airlines and companies engaged in the war effort. The airfield also became the operating base for certain U.S.Armed Forces, the British Air Commission, major airlines and companies engaged in the war effort. In support of the war effort, U.S. Army Air Forces pursuit groups, which provided fighter-plane protection for manufacturing plants in the greater Hartford area, were based at the airport. Between 1941 and 1945, the Main Street facility and the airport were leased by the U.S. government as part of this war effort.

In 1945, the airfield was modernized and expanded to include three asphalt runways, each a mile long, and a fully equipped, 57-foot control tower. Given the low elevation of the airport, fill was excavated from the Klondike Area and placed on the airport. This excavation accounts for some the wetland areas in the undeveloped area along the east side of the North Klondike Area. During this period, the Tie-Down Area, located in the South Klondike Area, was used to secure aircraft close to the runways. The Tie-Down Area was also used for aircraft refueling from an aboveground storage tank. In 1947 the name of the airport was changed from Rentschler Field to Rentschler Airport.

Throughout the 1930's and part of the 1940's, the Klondike Area remained undeveloped. In the early 1950's, the North Klondike Area was developed to include the numerous buildings and test stands in association with a project code named "Suntan". It has been reported by various sources that the term "Suntan Project" resulted from the use of hydrogen in test stands. At approximately this same time, undeveloped parcels to the east and south of the developed portion of the North Klondike Area were purchased.

In the late 1950's, the South Klondike Area was developed to include the Linde Gas Plant, the Cryogenics Building and the Fire Pump House. A firing range also existed in the South Klondike Area, although the exact times of construction and operation are unknown. A large portion of the Klondike Area, along the eastern most edge of the property, has been undeveloped throughout its history.

A new control tower, at the south end of Rentschler Airport, was built and occupied by May 1966. At that time, parking areas were enlarged to accommodate the expanding work force at the airport. Between 1965 and 1970 the South Klondike Area was expanded with the drum storage areas, the Quonset Hut Storage Area, the X-307 test stand, and the six storage yards included in the Virgin Products Storage Area. In 1967, new experimental test cells for the JT9D engine were constructed in the Klondike Area.

Rentschler Airport runways were lengthened in 1971. A microwave landing system was also installed in 1971 to improve night landings. With these improvements, Rentschler Airport became the second largest airport in Connecticut, smaller only than Bradley International Airport. Few major changes took place in the 1980's.

The majority of the Klondike Area remained active until the early 1980's when some test stands were dismantled and moved to other facilities off the Site. Through the late 1980's and early 1990's, the use of the Klondike Area was gradually diminished. The buildings in the Klondike Area were razed in 1993 with the exception of the generator/transformer room associated with the Fire Pump House in the South Klondike Area. The Airport was shut down in December 1994. Currently, the Airport/Klondike Area is no longer used for any production, testing or research operations.

2.4 Facility Operations

The Main Street facility is involved in the manufacture, development, and testing of jet engines and jet engine components. The facility has been used for the manufacture of aircraft engines and aircraft engine components since December 1929. Operations at the facility include, or have included in the past, metal parts machining, vapor degreasing, chemical etching, cleaning, electroplating, painting, assembly and testing, and research operations.

The Airport/Klondike Area was formerly used for experimental test operations as well as ancillary support operations for the factory main complex. There were various test stands or test cells for conducting test operations. Overall, most any type of testing for aircraft engine, jet-engine, rocket components were conducted within the test stands. The various types of testing included airflow, erosion, combustion, fire resistance, anti-icing, sound abatement, foreign object ingestion, crosswind, and vertical takeoff or landing (VTOL) performance.

To support the testing operations, the test stands were provided with any or all of the following services and utilities: compressed air, oxygen, hydrogen, nitrogen, methane, propane, DC and AC power (120, 240, and 480 volts), fuels (hard-piped or tank), fire protection equipment, and vacuum supply. The fuels for the test operations were either supplied from a central tank farm, such as the X-312 tank farm, from local tanks in the particular area, or from containers.

In the X-312 tank farm, the fuels were stored in three 3000 gallon, two 5000 gallon, and one 15,000 gallon underground storage tanks (USTs). From the USTs, the fuels were distributed by 3-inch underground piping to the X-307, X-309, and X-312 test stands. The fuels typically used included JP-4 and JP-5 jet fuels. Other test areas were provided with local aboveground storage

tanks (ASTs) if any appreciable quantities of fuels were necessary. A listing of both ASTs and USTs that have been identified is included on Table 2. This listing of tanks includes all tanks that have been identified including those providing fuels for testing operations or fuels for heating. Table 2 does not include tanks used for the storage of gases such as hydrogen, nitrogen, oxygen, or propane.

For the ancillary support activities, the South Klondike Area was predominantly used for materials storage such as the storage of virgin product used in the manufacturing operations and wastes resulting form the production operations. While the main waste storage and handling areas were part of the main factory complex, some waste storage of production wastes was reported for the Virgin Products Storage Area. Containers of oils and solvents have been stored on both paved and unpaved areas within the South Klondike Area. Another support activity in the South Klondike Area was the Linde Gas Plant for the production of hydrogen from natural gas.

Various areas within the Airport/Klondike Area were used to conduct fire training exercises. Flammable and combustible materials were used in the fire training exercises for the airport crash response team. Typically, the area was an earthen depression that was filled with flammable and combustible liquids prior to fire-fighting training exercises. One of the areas, Fire Training Area A, was a specially-constructed concrete and pavement area for the fire training exercises.

2.5 Waste Management Operations

The Main Street facility is involved in the manufacture, development, and testing of jet engines and jet engine components. Materials and processes used in those operations generate, or have generated, large quantities of wastes. These wastes include, or have included, industrial wastewater, dilute oily wastes, characteristic hazardous wastes (i.e., ignitable, corrosive, reactive, and toxic) and listed hazardous wastes (e.g., spent solvents).

P&W also utilizes, or has utilized, a wide variety of products that are hazardous wastes such as acids, alkalies, cyanides, alcohols, metal plating solutions, specialty solutions, fungicides, epoxy, cleaners, resins, paints, solvents, fuels, and many commercial chemical products listed in 40 CFR 261.33(e) and (f). PCB wastes have also been generated at the Main Street facility.

Specific processes which use the above products and which result in the generation of hazardous wastes include or have included the processes listed below. Note that processes followed by an asterisk (*) have virtually been eliminated the Main Street facility based on present operations.

- Product rinsing, stripping, cleaning, degreasing, alkali and acid cleaning, vapor degreasing*, salt bath descaling;
- Electroplating, etching, plating, anodizing, heat treating, electroless plating, painting operations, acid treatment (pickling), chromate conversions*;
- Abrasive jet machining, chemical machining, electrochemical machining*, electrical discharge machining, general machining;
- X-ray testing, fluorescent penetrant inspection, magnetic penetrant inspection, photo developing; and;
- Sludge removal, solvent reclamation*, battery replacement spill cleanup, process decontamination, cleaning fuel systems, remediation and decommissioning activities, removal of obsolete materials, machine oil changes, general maintenance and housekeeping activities.

In terms of the Airport/Klondike Area, the wastes could have included many of the same types of wastes generated at the main factory complex. These wastes could have included industrial wastewaters, dilute oily wastes, characteristic hazardous wastes (i.e., ignitable, corrosive, reactive, and toxic) and listed hazardous wastes (e.g., spent solvents) resulting from the test operations.

2.6 Area Descriptions

A general description of each of the sub-areas is provided below with more detailed discussions regarding the specific environmental units within each sub-area provided in the applicable USTM included with this report. These environmental units were selected based on the types of activities conducted at each area and the potential for those activities to have adversely impacted the various environmental media at the Site including, soil, groundwater, surface water, and sediment. Although other areas of the Site may have been impacted by historic practices at the Site, no other specific potential contaminant source areas were evident from the available information.

The Airport/Klondike Area is located on the eastern portion of the P&W Main Street facility on the east side of the main plant, north of Brewer Street and south of Silver Lane. The Airport/Klondike Area consists of 4 study areas that include the North and South Airport Areas and the North and South Klondike Areas. Within the 4 study areas addressed in this report, there

are a total of 24 sub-areas. Within the 24 sub-areas, there are a total of 104 environmental units that are described in 63 USTMs. The layout of the Airport/Klondike Area complete with the study areas and sub-areas is shown on Drawing 1. A complete listing showing the study areas, the sub-areas, the environmental units, as well as the breakdown of the USTMs is included in Table 1.

2.6.1 North Airport Area

The North Airport Area is an approximately 211 acre area that generally includes the majority of the airport proper. The North Airport Area consists of two sub-areas comprised of a total of six environmental units that are described in five USTMs. A complete listing showing the study areas, the sub-areas, the environmental units, as well as the breakdown of the USTMs is included in Table 1. The layout of the North Airport Area is shown on Drawing 1. A brief description of the two sub-areas is provided below.

2.6.1.1 Rentschler Airport

For purposes of this study, the Rentschler Airport Area is generally limited to the runway and taxi areas. The aircraft hangars and the airport terminal are not included as these areas are not part of the Airport/Klondike Area, the Site, that will be sold or transferred. The airfield was opened in 1931 as an all-turf airfield. Improvements were made through the years which resulted in the present configuration of two main runways. The Rentschler Airport was used for the take-off and landing of a variety of commercial and military aircraft.

Army Barracks that were used as temporary quarters of military personnel were once located on the northwestern portion of the airfield. The Army Barracks extended from the northern end of the north-south runway continued westward into the present UTRC Area. There were approximately thirty-three buildings (including barracks, mess, recreation, dispensary, supply and administration operations, warehouses, school, and radio) that were part of the Army Barracks complex.

2.6.1.2 Former Silver Lane Pickle Company

Based on available information, the Silver Lane Pickle Company had a varied production line that included different kinds of pickles and vinegars, horseradish, horseradish root, chowchow, German mustard, pepper relish, onion relish, sauerkraut, piccalilli, dill tomatoes, ketchup, and chili sauce. The former Silver Lane Pickle Company had three different areas where there were USTs of unknown sizes identified. From the northeast to the southwest, there were two USTs

with a dispenser pump at one location, three USTs at a second location, and one UST at a third location. The former contents of the USTs are not known, but were likely to have been fuels.

The Silver Lane Pickle Company sold the property to United Aircraft in 1954 and 1963 with the former buildings being demolished in 1963 and 1964. Since 1964, the property has been undeveloped. Along the western boundary of the former Silver Lane Pickle Company property, there are several contiguous piles of soil which contain various rubble and debris. Origin and reason why the soil piles were created is not known. It is possible that the soil piles were created during the demolition of the former buildings.

2.6.2 North Klondike Area

The North Klondike Area is an approximately 116 acre area that generally includes the northern half of the area to the east of the airport. The North Klondike Area consists of ten sub-areas comprised of a total of seventy environmental units that are described in thirty-two USTMs. A complete listing showing the study areas, the sub-areas, the environmental units, as well as the breakdown of the USTMs is included in Table 1. The layout of the North Klondike Area is shown on Drawing 1. A brief description of the ten sub-areas is provided below.

2.6.2.1 North Klondike Undeveloped Land Area

The land north and east of the developed portion of the North Klondike extends almost to Silver Lane to the north and Penney High School to the east. This area is mostly wooded, but has been cleared in some locations. Filling of low-lying areas and the accumulation of soil piles and debris has taken place along the western side of the North Klondike Undeveloped Land Area. Reportedly, this location has been used for parking lot sweepings and construction demolition materials. To the east of the soil piles, an area had been cleared, filled, and was used for the storage of vehicles. The area to the east has not been developed. Based on available information, the undeveloped area along the eastern edge of the Site has only been used for borrow material when filling and developing the airport.

2.6.2.2 X-401 Area

The X-401 test stand area consisted of one building, one shed, and a covered area (the Pavilion) containing a storage tank. Within the two buildings were test stands X-401, X-402, and X-403. Also included within this area were the Locker Room, Fire Training Area C, and the X-401 Dry Wells. The main building, which housed test stands X-401, X-402, and X-403, consisted of a concrete floor with two rooms and corrugated steel walls. The northern room contained the test

cells and the southern room contained the control room. The test cells were equipped with an exhaust duct and heat exchanger. Adjoining the test cells, a compressor was housed in a corrugated steel and wood frame enclosure and apparently provided the compressed air for engine testing.

The equipment shed was a wooden structure on a concrete slab floor. The conduit and an electrical service junction box rose from the floor in the southwest corner of the former shed. The Pavilion consisted of wooden frame structure with a corrugated metal roof. The floor was comprised of steel grating placed over a concrete block support. Copper tubing fuel lines connected the test cells/control room to the Pavilion, following a utility trestle which passed over the entrance drive to the control room.

Fire Training Area C was near the western edge of the X-401 Area. Flammable and combustible materials were used in the fire training exercises for the airport crash response team. An earthen pit was filled with water prior to fire-fighting training exercises.

Three dry wells were located north and west of the main building and received waste fluids from the test stands following tests. With the usage of fuel and cleaning solvents, these fluids may have been discharged to the dry wells. The X-401 Locker Room, which was located on the southeast edge of this area, was used by workers as a changing area and to wash up at the end of the day's activities. The Locker Room septic system was located north of the Locker Room.

2.6.2.3 X-407 Area

The X-407 Area consisted of five buildings and two sheds. The largest building contained the X-404, X-405, X-406, and X-407 test stands. Three smaller buildings contained the X-408 and X-409 test stands and a compressor. The compressor building was used to generate compressed air for engine tests. One shed on the southern portion of the area contained the North Klondike Pump House with booster pumps for the fire protection system.

This area was used as a general purpose test stand for testing any components requiring the available services and building construction. In addition, this area was also used as an erosion test stand which included the application of a flame and particles to a test specimen. In this area, engine tests were conducted which required the use of jet fuels and cleaning solvents. Tests were conducted from approximately 1957 until November 1979. At that time, the X-404, X-405, X-406, and X-407 test stands were converted for the storage of PCB-contaminated material and, eventually closed and demolished in 1993.

2.6.2.4 X-415 Area

The X-415 Area consisted of one building and one shed. The building contained the X-415, X-416, X-417, X-419, X-420, X-426, X-427, X-449, and X-450 test stands. The test stands were designed to handle small-scale (i.e.,"Bunsen Burner" sized) combustion experiments and for research and basic experimentation on advanced combustion projects. Infrared tests were conducted in the long and narrow portion of the building. To the east of the building was a shed which housed the X-451 test stand. An oil-fired boiler complete with an AST was operated in this area.

The X-415 Area was equipped with a washroom and toilet with a septic system located to the east of the test stand. A dry well was located east of this area and likely received drainage from the building either from the floor drains or plumbing fixtures.

2.6.2.5 X-430 Area

The X-430 Area consisted of one building. The building contained the X-430, X-431, X-432, X-433, X-434, X-435, and X-436 test stands. Specific information on the test operations for this area were not available. It is believed that at a minimum, this area was used as a general purpose test stand for testing any components requiring the available services and building construction. Testing in this area began in approximately 1957. Records show that these test stands were idle in November 1989. The building was demolished in 1993.

2.6.2.6 Explosives Storage Area

The Explosives Storage Area was located on the eastern side of the North Klondike Area and consisted of two buildings, a shed (fence-enclosed), and open storage areas. The buildings and areas were used to store explosives and chemicals. Other portions of the area was used for the general storage of parts and vehicles. These areas were generally utilized for storage of explosives (hydrazine, nitrogen tetroxide, and pentaborane) and chemicals (acids and gases). Although specific references have not been identified, it is possible that portions of this area was also used for storage of motor fuels and cleaning solvents. This area was used from approximately 1957 until the buildings were demolished in 1993.

2.6.2.7 X-194 Area

The X-194 Area (also known as the X-448 Area) consisted of three buildings. The two larger buildings contained the test stand and control room for the area. The smaller building was

known as the Block House. In this area, research activities were conducted which included test burns of tubes containing beryllium powder in a chemical binder. Tube-sized rocket motors that were powered with beryllium-containing fuels were also tested in this area.

In addition, PCB oils and PCB-contaminated electrical equipment were reportedly stored in this area. These materials may have been stored in the Block House which was a fortified structure originally used for the storage of beryllium fuels. Also included was a fenced, paved storage area for U.S. Government owned equipment. The grass areas to the north and northeast of this area were used to store transformers, capacitors, and other mechanical equipment. The building was later used to store fuels and oils in 55-gallon drums. This building was also used for storage of office equipment and racks for electrical equipment.

During operation, there was reportedly a wet air scrubber to the south of the test stand to remove beryllium particles from the test exhaust. After filtration, the water from the scrubber was reportedly discharged to the sedimentation pond southeast of the test stand.

2.6.2.8 X-410 Area

The X-410 Area consisted of four buildings and two stands. One building contained the X-410, X-411, and X-412 test stands including the control rooms connected to each of the test stands. One of the other large buildings was the Maintenance and Storage Building which was in the northeast portion of the area. The Maintenance and Storage Building was equipped with a washroom and toilet with a septic system located to the south of the building. Compressed gasses (oxygen and acetylene) along with batteries and lighting ballasts were stored in the Maintenance and Storage Building. Typical maintenance activities included welding, torch cutting, and vehicle maintenance.

This area was a general purpose combustion component test facility designed to develop small combustion components such as gas turbine main burners. In addition, this area was also used for conducting combustion developed sound surveys. The X-412 test stand was used to study the fire resistance of fuel control and gearbox components. In this area, engine tests were conducted which required the use of jet fuels and cleaning solvents. Tests were conducted from approximately 1957 until June 1984. The buildings were demolished in 1993.

2.6.2.9 MERL Area

The MERL Area consisted of two buildings and one shed. One building contained an explosives forming test house. An undesignated building was located east of the test house and a test shed

was south of this building. Minimal information on the operations for this area was available. In this area, explosives forming of sheetmetal was reportedly conducted. The buildings were demolished in 1993.

Fire Training Area D was located in this area. Flammable and combustible materials were used in the fire training exercises for the airport crash response team. An earthen pit was filled with water prior to fire-fighting training exercises.

2.6.2.10 X-312/X-314 Area

The X-312/X-314 Area consisted of two test stands with ancillary sheds and an underground storage tank farm. The X-314 test stand was used for radial sound surveys. Instruments (microphones) were set up on the outside radius of the cleared area surrounding the test stand. This test stand was an outdoor test facility designated for inlet and exhaust sound surveys, performance calibrations, crosswind testing, foreign object ingestion, and thermal distortion tests of the largest turbofan engines. The X-314 test stand was equipped with a washroom and toilet with a septic system located north of the stand trailer. This area was used from approximately 1957 until demolition in 1990.

The X-312 test stand was an open test stand comprised of a blacktop test pad. The stand was provided with a flat roof overhead shelter and roll-up canvas curtains for weather protection. Controls and instrumentation required to operate the test engines and monitor its performance were in a wood framed control room located approximately 75 feet from the test stand. In the X-312 test stand, engine tests including exhaust silencer, crosswind generator, foreign object ingestion gun, portable microphones, icing system, smoke testing, and strain gauge measurements were performed.

The X-312 Tank Farm was a fuel distribution system for test stands immediately to the north and to the south in the South Klondike. The six USTs comprising the tank farm were located at the southwestern corner of this area. Three 3,000-gallon, two 5,000-gallon, and one 15,000-gallon USTs provided fuel supply for the four adjacent test stands. Fuel was fed to test stands through a 3-inch underground pipe network. This area was used from approximately 1957 until its demolition in 1990. Records that detail the closure activities for the tank farm were unavailable.

2.6.3 South Klondike Area

The South Klondike Area is an approximately 131 acre area that generally includes the southern half of the area to the east of the airport. The South Klondike Area consists of seven sub-areas

comprised of a total of twenty-three environmental units that are described in twenty-one USTMs. A complete listing showing the study areas, the sub-areas, the environmental units, as well as the breakdown of the USTMs is included in Table 1. The layout of the South Klondike Area is shown on Drawing 1. A brief description of the seven sub-areas is provided below.

2.6.3.1 Tie-Down Area

Originally, the Tie-Down Area was used to secure aircraft close to the runways. The Tie-Down Area is located adjacent to the Perimeter Road and between the North and South Access Roads. The Tie-Down Area was also used for general storage of various equipment and parts.

The Tie-Down Area consisted of two engine testing areas (X-309 and B-24), a storage area, and Fire Training Area A. The X-309 test stand was an outdoor test facility designed for specialized testing of turbojet engines on the northern edge of the Tie-Down Area. The specialized testing included basic engine calibration, anti-icing, sound abatement, foreign object ingestion, crosswind, and vertical takeoff or landing (VTOL) performance. The engine exhaust area was covered with trap rock held down with heavy wire screen to prevent erosion. The X-309 test stand was dismantled in June 1984 and the rest of the area was demolished in 1993.

The B-24 test stand consisted of a concrete trench and an exhaust deflector on the southern edge of the Tie-Down Area. Tests were conducted in this area by suspending an operational engine from the bomb bay of a B-24 airplane into the concrete trench. Exhaust from the engine was directed into the exhaust deflector. The tests conducted in this area required the use of jet fuels and cleaning solvents. The exhaust deflector used in for the B-24 test stand remains.

Fire Training Area A, which was used from the late-1960s to the late-1980s, was along the south-eastern portion of the Tie-Down Area. Flammable and combustible materials were used in the fire training exercises for the airport crash response team. Originally, Fire Training Area A was an earthen depression that was filled with flammable and combustible liquids prior to fire-fighting training exercises. Reportedly, the training fires were conducted in shallow pans directly on the soil.

In 1984, Fire Training Area A was upgraded with the construction of concrete burns pit within an asphalt area. The impacted soils resulting from the prior use of the area were reportedly excavated for disposal off the site. The reconstructed Fire Training Area A consists of a paved area which measures 80 feet by 100 feet with asphalt berms running along the perimeter. Within the paved area, there are three concrete burn pits of various sizes that were used for the training fires. Catch basins are located in the center of the overall area as well as in each of the concrete

containment pits to collect rain water or any flammable liquids. The catch basins drain to an oil/water separator. Water from the separator discharged to the intermittent pond on the south side of the area.

2.6.3.2 Firing Range Area

A firing range was identified on an available drawing depicting a portion of the South Klondike Area. The firing range consisted of an apparent firing mound to the west and a kidney-shaped earthen backstop mound to the east. Based on a review of a 1948 aerial photograph, there appeared to be several connecting corridors between the mounds which may have represented devegetated pathways. The earthen backstop mound still exists, and is approximately 20 feet high and 100 feet long.

2.6.3.3 Former Linde Gas/Chemical Storage Building Area

The former Linde Gas Area was a 90,000-square foot area containing a hydrogen gas plant. The gas plant was used for the manufacture of hydrogen gas from natural gas. The former Linde Gas manufacturing plant was built in 1965 and was present until being replaced by the Chemical Storage Building in 1981. The exact dates of operation are unknown.

In 1981, the Chemical Storage Building was constructed as a 100 foot by 160 foot building divided into equal halves. The building was demolished in 1993. Immediately to the west of the Chemical Storage Building was a 25 foot by 35 foot building formerly known as the Control Room. The foundation of the Chemical Storage Building is a raised slab approximately 4 to 5 feet above the ground surface. The loading and unloading area was located on the south side of the Chemical Storage Building. A UST was located beneath the southern edge of the Chemical Storage Building and the former loading and unloading area. This UST was fuel oil tank of unknown size that had been used as part of Former Linde Gas operation.

In addition to the buildings, several outdoor storage areas of drums and a dumpster were observed on facility aerial photographs from approximately 1977. Two drum storage areas and one dumpster were formerly located north and west, respectively, of the former hydrogen gas plant (where the Chemical Storage Building was later constructed).

A pump dispenser island in the western portion of the area was observed on facility aerial photographs from approximately 1977. It was assumed that a UST would be located near the pump island. However, the size and contents of the UST are unknown. Presently, only the

concrete pad of the former pump dispenser island remains. It is possible that the pump island was utilized for the dispensing of the hydrogen gas.

2.6.3.4 Cryogenics Area

The Cryogenics Area included two buildings and two water storage tanks. One building was the Cryogenics Building and the other building was the Fire Pump House. The Fire Pump House was a "T"-shaped building immediately adjacent to two water storage tanks. A portion of the Fire Pump House contained an electrical generator for emergency power.

The Cryogenics Building contained two test stands, a machine shop, electric pumps and electric transformers. Specific information on the test operations for this area were not available. At a minimum, these test stands were used to conduct low-temperature tests. The Cryogenics Building was equipped with a washroom and toilet with a septic system located to the north of the building. The septic system used two septic tanks with separate leach fields. A dry well was located north-east of the building and was connected to the building's floor drains. This area was used from approximately 1957 until the buildings were demolished in 1993.

2.6.3.5 Virgin Products Storage Area

The Virgin Products Storage Area consists of six former storage yards, numbered from north to south, along with the Outside Drum Storage Area, the Quonset Hut Drum Storage Area, and the Barrel Storage Shed. The Outside Drum Storage Area was a fenced asphalt-paved area covering approximately 32,000 square feet with a small shed in the northwest corner.

The Quonset Hut Drum Storage Area included a Quonset Hut and an asphalt-paved outside drum storage area (located immediately south of the Quonset Hut). The Quonset Hut was a 40 feet by 88 feet corrugated metal building on asphalt pavement. The Quonset Hut was used for the storage of miscellaneous equipment including gasoline-driven snowblowers, lawn mowers, and yard tools. Presently, only the foundation remains. The Barrel Storage Shed was a small open-sided roofed shed. The shed was a 10 feet by 20 feet wood building used for storage.

The outside drum storage areas were used primarily for storing drums of oil products. Small quantities of flammable liquids were also stored in these areas, based on a review of facility fire-protection maps. Drums were observed on facility aerial photographs to be stored upright and stacked on their sides on asphalt pavement. Staining of the pavement and adjacent grass area was also observed on aerial photographs.

Each of the six storage yards is approximately 200 feet by 400 feet in size, and is partially paved. Based on historical information, including aerial photographs, each of the six storage areas had a different use and history. Storage Area 1 was used to store casting molds, wooden crates, various equipment, and other metal debris. Storage Area 2 was used for the storage of virgin product used in the manufacturing operations. Drums were stored upright and stacked on their sides in the past. Storage Area 3 consisted of a former outdoor storage area for drums of waste products, salvage vehicles, trays/chutes (apparently for the drying and transporting of machine parts), outdoor overhead lamp posts and fixtures. Storage Area 4 contained steel girders and frame members, "I"-beam winch supports and electric winches. Storage Area 5 contained painted steel "I"-beams and box girders. Storage Area 6 contained sealed crates.

2.6.3.6 X-307 Area

The X-307 test stand was first built in approximately 1957. This stand consisted of a test stand and a control house. In 1967, the original test stand was replaced with a larger facility consisting of a sunken building and a test stand. The building was built so it would not interfere with sound surveys conducted around the test stand. This test stand was equipped with a washroom and toilet with a septic system located to the east of the test stand.

This was a specialized outdoor test stand designed for sound surveys, limited performance testing, and crosswind testing of full-scale engines. In this area, various engine tests were conducted which required the use of jet fuels and cleaning solvents. The replacement test stand was demolished in 1993.

2.6.3.7 South Klondike Undeveloped Land Area

The undeveloped land east and south of the developed portion of the South Klondike encompasses an area of approximately 47 acres. This is a wooded area that has not been developed as part of the P&W operations conducted at the Site. P&W has not used this area for any production, testing, or ancillary activities.

2.6.4 South Airport Area

The South Airport Area is an approximately 135 acre area that generally includes the southern end of the airport to the southern most edge of the property. The South Airport Area consists of five sub-areas comprised of a total of five environmental units that are described in five USTMs. A complete listing showing the study areas, the sub-areas, the environmental units, as well as the

breakdown of the USTMs is included in Table 1. The layout of the South Airport Area is shown on Drawing 1. A brief description of the five sub-areas is provided below.

2.6.4.1 Fire Training Area B

Fire Training Area B, which was used from the early-1950s to the mid-1970s, was near the present control tower in the South Airport Area. Flammable and combustible materials were used in the fire training exercises for the airport crash response team. Overall, Fire Training Area B was an unpaved area which measured approximately 1,500 feet by 300 feet with the actual combustion area being much smaller. An earthen pit, approximately 40 feet in diameter, was filled with water prior to fire-fighting training exercises. A mock airplane fuselage is clearly visible in various aerial photographs.

2.6.4.2 South Airport Fill Area

The South Airport Fill Area is an extensive area of fill with smaller areas of fill nearby. The ground surface in this area was observed to contain various debris including asphalt, brick, concrete, and clay tile pipe. Debris was also visible along the banks of an unnamed brook on the west, and along the banks of Pewterpot Brook on the south. The source for the fill and debris is unknown.

2.6.4.3 Tank Trailer Storage Area

This area is utilized for the storage of empty box trailers and bulk liquid tank trailers. The bulk liquid tank trailers are used by P&W for the transportation of hazardous waste and fuels. Various pieces of equipment is also stored in this area, including engines in a fenced area, stands for holding engines, and miscellaneous metal equipment.

2.6.4.4 Contractor Storage Area

The Contractor Storage Area consisted of a series of small paved areas enclosed with chain-link fencing which were used as marshaling areas for various contractors doing work at the Main Street facility. Many of these areas were used to store box trailers for the storage of equipment. Relatively small quantities of fuels, paints, and cleaning fluids were stored in sheds or trailers. This area has been used since 1970 and is still being used today to a limited degree.

2.6.4.5 Former Storage Area

The Former Storage Area was a one-time, temporary soil stockpile area at the Main Street facility. Contaminated soil excavated during the removal of USTs was temporarily stored in an area south of Rentschler Airport. The UST removals took place between January and April 1989 with contaminated soil generated during the removal activities stockpiled for approximately six months prior to being transported off the site for disposal. The contaminated soil had been impact by virgin solvent (i.e., tetrachloroethene and trichloroethene), petroleum-based fuels and lubricating products

The Former Storage Area consisted of five stockpiles for temporary on-site storage of contaminated soil and covered an approximately 40 feet by 120 feet area. Each soil pile was located in a bermed area, lined and covered with six-millimeter polyethylene sheeting. Only two of the five piles (designated Soil Pile Nos. 1 and 2) were used for storage of soil that contained hazardous waste (i.e., U210, U220, U226, U228, and U239). However, the exact storage location of these two piles of soil containing hazardous waste within the area covered by all five soil piles is unknown. Therefore, the entire 40 foot by 120 foot temporary soil storage area, identified as the Former Storage Area, is addressed as a regulated unit under the Resource Conservation and Recovery Act (RCRA).

Presently, the Former Storage Area is vacant and surrounded by a four-foot snow fence. P&W plans to complete clean closure of the Former Storage Area prior to the sale or transfer of the property. Accordingly, P&W has conducted a soil sampling and analysis program focused on the constituents of concern and possible exposure pathways discussed in the RCRA Closure Plan to support the clean closure.

2.7 Previous Investigations

The Airport/Klondike Area has been the subject of specific investigations and included in site-wide investigations related to environmental conditions since the mid 1960's. These reports and other sources of information were reviewed in an attempt to consolidate the information and evaluate the coverage to determine the focus of future investigations. Other smaller reports and work in progress provided additional supporting data. A listing of reports for investigations conducted in the Airport/Klondike Area is included in the References at the end of this report.

Available information has been included in the USTMs for each of the environmental units. Much of the history of the use of these environmental units was found in the previous investigation reports. Other supporting information came from facility files or personal

communications. This information was compiled from all of the available resources and included in the USTMs. A listing of specific references utilized in preparation of the USTMs has also been included at the end of each individual USTM. These USTMs are presented in separate volumes. Generally, the history each unit is well documented. However, specific details regarding the operation of these units was not always available. Information on the review of available data was discussed previously.

In 1990, Westinghouse Environmental and Geotechnical Services, Inc. (Westinghouse) completed a Current Assessment Summary (CAS) for the Main Street facility. Subsections of this report addressed the Airport/Klondike Areas. Concurrent with the preparation of the CAS, Westinghouse also prepared a Preliminary Reconnaissance Survey of the Airport/Klondike Area. The work by Westinghouse included documentation of past uses, field reconnaissance, an electromagnetic survey, a seismic refraction survey, aquifer testing, and soil and groundwater sampling associated with soil boring and monitoring well installations.

In 1992 and 1993, Haley & Aldrich, Inc. (H&A) completed a Site-wide Environmental Monitoring Report for the Main Street facility. The work by H&A included soil and groundwater sampling associated with soil boring and monitoring well installations. Subsections of the H&A report discussed analytical results of subsurface, groundwater, surface water and sediment samples collected during the investigation activities.

Later in 1992 and 1993, Metcalf & Eddy, Inc. (M&E) completed Site Investigation Reports for the Airport/Klondike Area. The activities by (M&E) included a review of background data, a walk-through inspection, and environmental sampling. The environmental sampling included sampling and analysis of surface water, sediment, surface soil, subsurface soil, and groundwater. In these reports, the subsurface investigations focused on Fire Training Area C, the X-401 dry wells, and the X-430 Area in the North Klondike Area; the Virgin Products Storage Area (VPSA), the Cryogenics Area, and the Quonset Hut Area in the South Klondike.

In the fall of 1992, H&A conducted an Environmental Assessment at the former PCB Storage Building in the X-407 Area. The work by H&A included the collection and analysis of wipe, soil, and groundwater samples for the PCB Storage Building.

In 1994, septic systems in the Klondike Area were investigated by LEA as part of the Klondike Septic System Investigation. These septic systems included the X-410 Maintenance and Storage Building Septic System, the X-401 Locker Room Septic System, the Cryogenics Building Septic System, and the X-307 Septic System. The purpose of the investigation was to assess soil and

groundwater conditions in the areas that may have been impacted as a result of the usage of the septic systems. Soil and groundwater sampling associated with soil boring and Geoprobe® screenpoint installations was conducted as part of this investigation.

3. INVESTIGATION METHODOLOGIES

The investigative methods and procedures followed to characterize the site environmental setting, to assess the nature and extent of release(s) to soil or groundwater due to activities conducted at the Site, and to support remedial activities are presented in this section. The procedures used to perform soil borings, install monitoring wells, and obtain samples of soil and groundwater for the investigation at Site are summarized below. Specific investigation methodologies are detailed in the individual Technical Memoranda (TM) included in this report.

The field investigation activities were conducted in accordance with the Site Health and Safety Plan prepared for the project. Additional information regarding sample management, documentation requirements, laboratory methods, and analytical quality assurance (QA)/quality control (QC) procedures were presented in the Quality Assurance Manual (QAM) in the Voluntary Corrective Action Program Work Plan.

The following sections provide a brief description of the approach, rationale, and types of investigation activities performed to characterize the environmental setting and to delineate contamination at the Site. Details of the environmental setting investigation activities are presented in Section 3.2 and details of contaminant delineation activities are presented in Section 3.3.

3.1 Overview of Data Gaps

Hydrogeologic conditions at the Site have been studied by others in the past. Monitoring wells and soil borings were installed as part of those investigations. This existing monitoring wells, soil borings, and soil and groundwater quality information has been incorporated into the site hydrogeological conceptual model.

Boring logs, water-level measurements, and water-quality data from existing wells and borings around the Site were reviewed to develop an understanding of site hydrogeology and the relationship between observed groundwater contamination and the locations and types of potential contaminant source areas. The available information indicated that inorganic constituents, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs), primarily chlorinated solvents and associated degradation products, were detected in groundwater at the Site. However, the locations of the monitoring wells and the limited number of groundwater samples that had been collected did not provide sufficient information either to develop a complete understanding of the hydrogeology of the

Site, to assess the overall groundwater quality, or to evaluate the relationship between the groundwater quality and any potential contaminant source areas.

Following the evaluation of the existing hydrogeologic and water-quality information, data gaps were identified in several areas of the Site. The investigation activities were intended to bridge these gaps in the hydrogeologic database. Individual monitoring wells consisting of shallow (water table) wells and monitoring well clusters consisting of a shallow monitoring well and a deep or an intermediate monitoring well (as appropriate for the conditions at the Site) were installed for the purpose of defining site-wide hydrogeology. Shallow monitoring wells were installed with screens positioned across the water table for the purpose of determining water-table elevations and groundwater flow directions in the shallow zone of the aquifer, as well as for delineating contamination in specific areas.

3.2 Environmental Setting Investigations

The environmental setting investigation was designed to develop an understanding of soil and groundwater characteristics across the Site, particularly in the context of how those conditions might affect the fate and transport of potential contaminants. The objective was to define site stratigraphy and hydrogeology sufficiently to refine the conceptual hydrogeologic model for the Site. The information obtained was used to evaluate potential contaminant migration pathways and transport mechanisms in order to assess the need for, applicability, and effectiveness of potential remedial technologies.

Protocols and procedures for the completion of the environmental setting investigation tasks were presented in the Standard Operations Procedures (SOPs) included in the Voluntary Corrective Action Program (VCAP) Work Plan and are documented in the appropriate TMs included in this report.

3.2.1 Soils Investigations

The purpose of the soils characterization portion of the environmental setting investigation was to define the stratigraphy and physical properties of the unconsolidated materials in both the saturated and unsaturated zones. The stratigraphy describes the distribution of unconsolidated materials across the Site, with particular emphasis on the characteristics of those materials that affect contaminant migration pathways and transport mechanisms. The physical properties, including permeability, sorptive capacity, density, and grain size, affect contaminant migration and the evaluation, design, and performance of potential remedial measures.

This section describes the specific soil borings and sampling performed in order to define site stratigraphy and soil properties and provide an overview of hydrogeologic conditions across the Site. Soils information was gathered during direct soil sampling and during groundwater monitoring well installation. Soil borings advanced for the purpose of contaminant delineation in the unsaturated zone also served to further refine site stratigraphy and the conceptual hydrogeologic model.

The following information on the unconsolidated deposits was gathered for purposes of the environmental setting investigation:

- Description and stratigraphy of the unconsolidated materials encountered at each monitoring well location.
- Description and stratigraphy at each boring conducted to evaluate nature and extent of contamination.
- Laboratory analysis for physical and general geochemical characteristics of soil samples collected from monitoring well borings.

Soil borings were drilled at each of the monitoring wells installed as part of the groundwater characterization. Continuous soil sampling was conducted from the ground surface to the glaciolacustrine sediment surface at each location. Continuous samples were retrieved with the use of split-spoon sampling techniques. Soil samples were classified according to a modified Burmister soil classification system.

Soil borings advanced for shallow monitoring well installations were conducted with a standard hollow-stem auger drilling and continuous split-spoon sampling techniques. Soil borings advanced for intermediate and deep monitoring well installations were conducted with standard drive-and-wash and split-spoon sampling techniques. Soil borings advanced as part of the contaminant delineation borings were installed using Geoprobe® direct-push techniques. For monitoring wells, the procedures for drilling, sampling, and decontamination are included in *Technical Memorandum (TM) 1, Monitoring Well Installation and Development and Soil Sampling*. For soil borings, the procedures for drilling, sampling, and decontamination are included in*(TM) 5, Soil Boring Installation and Soil Sampling*

All spent decontamination fluids generated during drilling activities and purge water generated during monitoring well development activities for the investigation were placed in 55-gallon, closed-top drums supplied by Pratt & Whitney (P&W) for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

All soil cuttings generated during drilling activities were placed in 55-gallon, open-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

Soil samples were screened in the field for total VOCs using a portable photoionization detector (PID) or a flame-ionization detector (FID). The results of the field screening provided initial information on subsurface VOC contamination. In addition, soil samples collected as part of the contaminant delineation investigation were analyzed at the LEA Analytical Laboratory for target VOCs using a portable gas chromatograph (GC). Screening results were used to help select soil samples for analyses at an off-site analytical laboratory. The screening analyses conducted at the LEA Analytical Laboratory are described in *TM 7 Loureiro Engineering Associates Analytical Laboratory.*

3.2.2 Groundwater Investigations

The purpose of the groundwater characterization portion of the environmental setting investigation was to define groundwater elevations and aquifer characteristics across the Site. The object was to characterize the hydrogeologic characteristics and groundwater flow regime across the Site in order to understand and evaluate potential contaminant fate and transport pathways and mechanisms.

This section describes the installation of new monitoring wells (including cluster wells that are screened in deeper portions of the unconsolidated aquifer), aquifer testing methodologies, and the collection of water-level measurements. Analysis of groundwater for water quality is described in Section 3.3.2.

3.2.2.1 Installation of New Monitoring Wells

This section describes the installation of new monitoring wells designed to provide the information for refining the conceptual model of site hydrogeology. These wells were installed within soil borings described in the previous section.

In general, these new wells were planned as shallow, water-table monitoring wells to monitor hydraulic head and water quality in the upper portion of the unconsolidated aquifer. Monitoring well locations were selected not only for the purposes of obtaining hydrogeologic data, but also for obtaining water-quality information relative to potential contaminant source areas.

Well depths for newly installed water-table wells were based on the depth to groundwater at the individual well locations. These wells were screened to a depth of approximately 5 to 7 feet below the top of the water table.

Well depths for any intermediate or deep wells were determined after the soil boring at each well cluster location was completed, at which time the depths to various subsurface horizons were known and identification of aquifer materials had been completed.

3.2.2.2 Well Locations

The installation of multiple-well clusters, and shallow wells has been conducted over a period of years in response to the needs of various environmental investigations. Table 3-1 summarizes the rationale for installation of groundwater monitoring wells at the Site. A total of 2 well cluster locations, 50 shallow well locations, and 16 piezometers have been installed in the Airport/Klondike Area, to address either hydrogeologic or water-quality data gaps.

3.2.2.3 Well Construction

The monitoring wells were constructed of 2-inch diameter, Schedule 40 polyvinyl chloride (PVC) flush-threaded screen and casing, except at specific wells (i.e., NA-MW-05 through NA-MW-07, NK-MW-18, and NK-MW-19) where 0.5-inch diameter, Schedule 40 PVC Geoprobe® Prepack screen and casing were installed with the Geoprobe®. Construction materials and procedures for the standard monitoring wells were in general accordance with the *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1 and the *Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells (EPA 600/4-89/034)* (U.S. EPA/NWWA, 1989).

Screen lengths for all of the shallow monitoring wells were no longer 10 feet. Screens for the shallow wells were positioned across the water table, as observed at the time of installation, with approximately 5 to 7 feet of screen placed below the water table. For the intermediate and deep wells, 5-foot screen lengths were used. The screened intervals for the intermediate and deep wells were determined based on observations made during soil sampling (i.e., visual indications, odor, or screening for volatile organics) and the intended vertical position within the aquifer.

A description of well construction and completion procedures used, including a schematic illustration of a typical monitoring well, is found in *TM 1, Monitoring Well Installation and Development and Soil Sampling*. Upon completion, the horizontal location and elevation of the new wells and existing wells, were surveyed.

In addition to the permanent groundwater monitoring wells installed throughout the Airport/Klondike Area, Geoprobe® screenpoint samples were collected from discrete locations. Geoprobe® Screen-Point samplers are temporarily emplaced sampling devices consisting of a stainless-steel well screen driven to the desired sampling depth and unsheathed. Groundwater samples are collected as if from monitoring wells, however, the sampling devices remain in the borehole only as long as necessary to collect the sample. The techniques used to collect screenpoint groundwater samples is detailed in TM 1. Screenpoint groundwater samples were used to supplement the groundwater quality data collected from the permanent monitoring well network and to direct the location of permanent monitoring wells.

3.2.2.4 Well Development

Completed monitoring wells were developed no sooner than 72 hours after well completion to allow grout materials time to set up. Development was performed to remove fine sediment from the well, the screen openings, and filter pack and to facilitate groundwater flow to the well. Development procedures included pumping and surging using a surge block and submersible or inertial pumping methods. Development of Geoprobe® Prepack monitoring wells was performed by pumping, since the small internal diameter of these wells does not allow effective surging.

Development continued until the turbidity of water produced from the well was below specified criteria and until pH, temperature, and conductivity had stabilized. Development methods and criteria are specified in *TM 1, Monitoring Well Installation and Development and Soil Sampling.*

Equipment used inside the well casing was dedicated or decontaminated prior to use. Development water was placed in 55-gallon, closed-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

3.2.2.5 Water-Level Measurements

Groundwater elevations was measured in all newly installed wells and existing wells using an electronic water-level measurement device. Water levels were measured to the nearest 0.01 foot. Reference elevations for the monitoring wells were surveyed to the National Geodetic Vertical Datum (NGVD) of 1929. Procedures for collecting water-level measurements and surveying locations are detailed in *TM 2, Water-Level Measurements and Site Survey Data.*

Water-level measurements were collected on various occasions beginning in 1990, and continuing through 1998. Data from select measuring events were used to produce contour maps

of water-table elevations and to evaluate horizontal and vertical hydraulic gradients within the aquifer. These contour maps are presented in TM 2.

3.2.2.6 Hydraulic Conductivity Testing

During March 1990, *In situ* aquifer testing was performed at ten well locations in the Airport/Klondike Area, all of which produced usable data. All but one of the wells, SK-MW-08D, were screened across the water table. Monitoring well SK-MW-08D was screened in the glaciolacustrine sediments. Aquifer testing consisted of "slug/bail tests" to determine hydraulic conductivity of the aquifer materials. The slug tests were performed and analyzed in accordance with the Bouwer and Rice methodology.

Hydraulic conductivity values for the upper portion of the aquifer, as estimated from the test data, ranged from approximately 6.8 feet per day (0.002 centimeters per second) to 53.5 feet per day (0.019 centimeters per second). These data are consistent with published hydraulic conductivity values for similar geologic materials. However, the test data from SK-MW-01 indicated a hydraulic conductivity of approximately 0.46 feet per day (1.6×10^{-4} centimeters per second). This value is approximately two orders of magnitude below the typical hydraulic conductivity values for similar materials. There is no apparent cause for this discrepancy.

Hydraulic conductivity values for the glaciolacustrine sediments, as estimated from the test data, was approximately 0.0065 feet per day (2.3×10^{-6} centimeters per second). This value is consistent with published hydraulic conductivity values for similar geologic materials.

3.2.3 Surface Water / Groundwater Interaction

Surface water/groundwater interactions in the Airport/Klondike Area were estimated by measuring the difference in water levels between the upper aquifer and the surface water body. Three surface water piezometers, SK-PZ-01 through SK-PZ-03, have been installed in Pewterpot Brook in the South Klondike Area. These piezometers begin in the area just west of the Virgin Product Storage Area and continue south to approximately the southeast corner of the airport. These three piezometers allow simultaneous measurement of the stage of Pewterpot Brook and the water table elevation at the same location, and therefore, an estimation of the surface water/groundwater interaction in that area.

Two surface water piezometers, NK-PZ-01 and NK-PZ-02, have been installed in unnamed tributary to Pewterpot Brook in the North Klondike Area. These piezometers are located in the portion of the surface water immediately west of the X-430 Area. These two piezometers allow simultaneous measurement of the stage of the unnamed tributary and the water table elevation at

the same location, and therefore, an estimation of the surface water/groundwater interaction in that area.

In the South Klondike Area, measurements of the stage of the brook and water-table elevation have been made during the water level gauging events of 1997. These data have been used to calculate the apparent direction of groundwater flow between the brook and the upper aquifer. These data are presented in *TM 2 Water-Level Measurements and Site-Survey Data.*

During both the June 1997 and November 1997 events, the water-level measurements indicate that Pewterpot Brook is a gaining stream in the reach between SK-PZ-01, west of the Virgin Product Storage Area, southward to SK-PZ-02. That is, the elevation of the water table is higher than the stage of the stream and groundwater would tend to flow from the aquifer into the stream. During the June 1997 event, the data collected from piezometer SK-PZ-03 indicated that the stream was a losing stream in that portion of the stream, but was a gaining stream during the November 1997 gauging event.

3.2.4 Surface Water and Sediment Investigations

Surface water and sediment samples have been collected from selected locations throughout the Site to evaluate the potential impacts of site activities on those media. A total of thirty-five surface water and sediment sampling locations have been established in the Airport/Klondike Area: two in the North Airport Area, six in the North Klondike Area, ten in the South Airport Area, and seventeen in the South Klondike Area. These surface water/sediment locations have been situated in Willow Brook, Pewterpot Brook, and the various unnamed tributaries to these streams. The locations of these sampling points has been chosen to provide relatively complete coverage of the surface water bodies on the Site. These surface water/sediment sampling locations have been surveyed to provide a horizontal location data.

In some cases, the surface water/sediment sampling locations are simple staff gauges, from which surface water elevation data can be determined. In other cases the surface water/sediment sampling locations are stream piezometers from which both surface water and groundwater elevation data can be determined.

Sediment sampling during the most recent investigation activities was conducted in general accordance with the LEA SOP *Standard Operating Procedure for Sediment Sampling in Shallow Rivers and Ponds.* Sediment samples were collected at the same spatial locations as surface water samples. Sediment samples were collected using pre-cleaned, stainless steel hand trowels or scoops, or hand augers. After collection, the sampling device was brought to the surface and

the sediment was transferred to pre-labeled laboratory-supplied sampling containers using stainless-steel spatulas.

Surface water samples were collected by first identifying the appropriate sampling location. The sampling location was approached from a downstream direction, disturbing the bottom sediments as little as possible, and the depth to the surface water surface from the surveyed reference point was gauged. Sample containers were filled directly from the stream flow by immersion of the pre-labeled laboratory-supplied sample containers into the stream waters. Sample information, including date and time, location, sample number, depth to the surface water, and pertinent observations were recorded on the appropriate field forms.

After collection, all samples were placed into iced coolers for transportation to the analytical laboratory under chain-of-custody control.

Specific data and a more detailed discussion of the sample collection techniques employed in collecting surface water and sediment samples is presented in TM 6 *Surface Water and Sediment Sampling.*

3.3 Contaminant Delineation Investigation

The primary objectives of the contaminant delineation investigation were to define the nature and extent of contamination in potentially affected media across the site. The approach consisted of two principal phases:

- Identification and nature of contamination
- Delineation of the extent of contamination, as appropriate.

This section is organized by the different media that potentially have been affected by releases of hazardous material at the facility. Soil is discussed first, followed by groundwater. Detailed discussions of the field methodologies employed in these investigations, standard operating procedures for the field activities, and descriptions of the results of the contaminant delineation investigation are included in the appropriate TMs and USTMs presented in this report.

3.3.1 Soils Contaminant Delineation Investigations

This section describes the scope of sampling activities that were conducted to define the nature and extent of soils contamination in the unsaturated zone across the site. Any contamination detected could indicate potential source areas for future migration to groundwater and/or surface water. The data collected through this investigation was also used in developing the site-wide

conceptual hydrogeologic model. The nature and extent of contamination present in the saturated zone is addressed in Section 3.3.2.

The approach to the delineation of contamination varied across the Site depending on the probability of contamination, relative impact of potential contamination, types of contaminants, and the physical mechanisms of contamination. The soil sampling approach varied in terms of the number and spatial distribution of samples and the types of analyses performed. A detailed discussion of the sampling approach at each potential contaminant source area is presented in the TMs and Unit-Specific Technical Memoranda (USTMs) provided in this report.

The general approach to the delineation of contamination in unsaturated zone soils was as follows. The nature of contamination at individual areas or environmental units was assessed through initial sampling. If results indicated that contaminants were present, an evaluation of the need for additional sampling was made. When appropriate, the extent of contamination was assessed through a supplemental boring and soil sampling program. The supplemental sampling program assessed the horizontal and vertical distribution of contaminants and provided information to evaluate potential remedial measures as necessary.

The nature of contaminants in each area was characterized by analyzing soil samples for those constituents that have the potential to be present in the subsurface due to historical activities in that particular area. The results of the analyses performed during the initial round of sampling were used to select indicator parameters for any sampling to determine the extent of contamination that was or would have been undertaken. Typically, an analytical method was eliminated if data indicated that a constituent had not been detected or was significantly below reference levels. The initial analytical results for constituents such as metals and SVOCs from a specific environmental unit was typically deemed to be sufficient to adequately characterize the nature and extent of those constituents in that unit.

Screening of soil samples using a portable gas chromatograph (GC) was conducted for target VOCs at those locations where VOCs were potential contaminants. Screening results were used to aid in the selection of soil samples that were to be submitted for more comprehensive analysis at an offsite laboratory. Screening level analytical data were collected for soil samples collected from most of the environmental units at the Site.

The initial sampling program at a given environmental unit was designed to characterize the nature of contaminants present in soils at each location. This characterization consisted of sampling soils within each area and analyzing the samples for the constituents noted in the USTMs presented in this report. A list of all potential constituents for which analysis might be

performed was presented in the Voluntary Corrective Action Program Work Plan, along with the analytical methods and practical quantitation limits for the individual constituents.

After the initial round of sampling and analysis was performed in a given area, one of two subsequent steps, was generally taken.

- If it was not clearly evident that additional investigation was necessary to characterize the nature and extent of contamination at that unit, no further investigation was undertaken at that time.

- If the presence of contamination was confirmed above reference levels and/or additional information was clearly required in order to adequately characterize the extent of the release, to determine whether further action was warranted, and/or to evaluate appropriate subsequent actions to address the release, supplemental sampling was conducted in the area.

Any supplemental sampling deemed necessary was designed to assess the vertical distribution and the horizontal extent of contaminants in the unsaturated zone to evaluate potential remedial measures. For organic compounds, the list of indicator parameters included the class of organic compounds detected during the initial sampling. For example, if PCE was detected, then other chlorinated VOCs, such as degradation products, were included in the list of indicator parameters. For selected areas, analysis of Synthetic Precipitation Leaching Procedure (SPLP) extract for metals was conducted on selected samples for evaluating the leachability of those inorganic constituents. If the concentrations of inorganics was representative of background concentrations and did not indicate a release, SPLP analyses were not conducted.

3.3.2 Groundwater Contaminant Delineation Investigations

This section describes the scope of sampling activities that were conducted to define the nature and extent of groundwater contamination in the saturated zone across the Site. Any contamination detected in groundwater could indicate potential source areas for future migration to surface water and/or to volatilize to the air. The data collected through this investigation was also used in developing the site-wide conceptual hydrogeologic model.

The approach to the delineation of groundwater contamination varied across the Site depending on the probability of contamination, relative impact of potential contamination, types of contaminants, and the physical mechanisms of contamination. The groundwater sampling approach varied in terms of the number and spatial distribution of samples and the types of

analyses performed. A detailed discussion of the sampling approach at each potential contaminant source area is presented in the TMs and USTMs provided in this report.

The nature of contamination at individual areas or environmental units was assessed through initial soil sampling, and, where available, from groundwater quality data. If results indicated that contaminants were present, an evaluation of the need for additional sampling was made. When appropriate, the extent of contamination was assessed through a supplemental groundwater sampling program. The supplemental sampling program assessed the horizontal and vertical distribution of contaminants and provided information to evaluate potential remedial measures.

The nature of contaminants in each area was characterized by first analyzing soil samples for those constituents that had the potential to be present in the subsurface due to current or historical activities in that particular area and by reviewing any available groundwater quality data. The results of the analyses performed during the initial round of sampling were used to select indicator parameters for any sampling to determine the extent of contamination that was or would have been undertaken. An analytical method was eliminated if data indicated that a constituent had not been detected or was significantly below reference levels.

The initial sampling program at a given environmental unit was designed to characterize the nature of contaminants present in the groundwater at each location. This characterization consisted of sampling the groundwater at each area and analyzing those samples for the constituents noted in the USTMs presented in this report. A list of all potential constituents for which analysis might be performed was presented in the Voluntary Corrective Action Program Work Plan, along with the analytical methods and practical quantitation limits for the individual constituents.

After the initial round of sampling and analysis was performed in a given area, one of two subsequent steps, was generally taken.

- If it was not clearly evident that additional investigation was necessary to characterize the nature and extent of contamination in the groundwater at that unit, no further investigation was undertaken at that time.

- If the presence of contamination was confirmed above reference levels and/or additional information was clearly required in order to adequately characterize the extent of the impacts to groundwater, to determine whether further action was warranted, and/or to evaluate appropriate subsequent actions to address the contamination, supplemental groundwater sampling was conducted in the area.

Any supplemental sampling deemed necessary was designed to assess the horizontal and vertical extent of contaminants in the groundwater and the likely source of those contaminants to evaluate potential remedial measures. For organic compounds, the list of indicator parameters included the class of organic compounds detected during the initial sampling. For example, if PCE was detected, then other chlorinated VOCs, such as degradation products, were included in the list of indicator parameters.

TABLES

Table 3-1 Monitoring Well Locations and Rationale Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut	
Monitoring Well ID	**Rationale/General Location**
NA-MW-01	Areal coverage - North Airport
NA-MW-02	Areal coverage - North Airport
NA-MW-03	Areal coverage - North Airport
NA-MW-04	Areal coverage - North Airport
NA-MW-05	Former Pickle Company
NA-MW-06	Former Pickle Company
NA-MW-07	Former Pickle Company
NA-PZ-01	Water levels - North Airport
NA-PZ-02	Water levels - North Airport
NA-PZ-03	Water levels - North Airport
NA-PZ-04	Water levels - North Airport
NA-PZ-05	Water levels - North Airport
NA-PZ-06	Water levels - North Airport
NA-PZ-07	Water levels - North Airport
NA-PZ-08	Water levels - North Airport
NA-PZ-09	Water levels - North Airport
NA-PZ-10	Water levels - North Airport
NA-PZ-11	Water levels - North Airport
NA-PZ-12	Water levels - North Airport
NK-MW-01	Northeastern property corner
NK-MW-02	Suntan Area
NK-MW-03	Suntan Area
NK-MW-04	Suntan Area
NK-MW-05	Suntan Area
NK-MW-06	Soil storage area
NK-MW-07	Former tank farm
NK-MW-08	Former PCB Storage Building
NK-MW-09	Former PCB Storage Building
NK-MW-10	Former PCB Storage Building
NK-MW-11	Former PCB Storage Building
NK-MW-12	South of Suntan Area Access Road
NK-MW-13	X-314 Test Stand
NK-MW-14S	X-410 and X-412 Test Stands
NK-MW-15S	Western North Klondike areal coverage
NK-MW-16	X-430 through X-436 Test Stands Steel Tank Area
NK-MW-17	North Klondike Soil Piles
NK-MW-18	X-430 Test Stand
NK-MW-19	X-401 Test Stand

Table 3-1 Monitoring Well Locations and Rationale Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut	
Monitoring Well ID	**Rationale/General Location**
NK-PZ-01	Water levels - North Klondike
NK-PZ-02	Water levels - North Klondike
SA-MW-01	Fire Training Area
SA-MW-02I	Contractor Storage Area
SA-MW-03	Fire Training Area
SA-MW-04	Contractor Storage Area & Former Soil Stockpile
SA-MW-05I	Monitor base of aquifer at SA-WM-05S
SA-MW-05S	Contractor Storage Area
SA-PZ-01	Water levels - South Airport
SA-PZ-02	Water levels - South Airport
SK-MW-01	South Klondike Graoundwater Quality
SK-MW-02	South Klondike Graoundwater Quality
SK-MW-03	South Klondike Graoundwater Quality
SK-MW-04	South Klondike Graoundwater Quality
SK-MW-05	Virgin Product Storage Area
SK-MW-06	Fire Training Area
SK-MW-07	Chemical Storage Building in Linde Area
SK-MW-08D	Base of aquifer at SK-MW-08S
SK-MW-08S	North-South Airport Area
SK-MW-09	Stratigraphy - Eastern property corner
SK-MW-10	Stratigraphy - Eastern property corner
SK-MW-11	Quonset Hut
SK-MW-12	Fire Training Area
SK-MW-13	Southeast property corner
SK-MW-14I	Storage Yard 3
SK-MW-15I	Former drum storage area south of Cryogenics Builidng
SK-MW-16	Fire Training Area and Tie-Down Area
SK-MW-19	Virgin Product Storage Area
SK-MW-20	Virgin Product Storage Area
SK-MW-21	Virgin Product Storage Area
SK-MW-22	Virgin Product Storage Area
SK-MW-23	Virgin Product Storage Area
SK-MW-24	Virgin Product Storage Area

TABLE 1
ENVIRONMENTAL UNITS

Airport/Klondike Area
Pratt & Whitney Main Street Facility

	AREA USTM	INDIVIDUAL USTM	DATE SUBMITTED	DATE REVIEWED	DATE REVISED
NORTH AIRPORT AREA					
Rentschler Airport	X		3/31/98	4/9/98	4/21/98
Runway Area	O				
Former Army Barracks Septic Systems		X			
Silver Lane Pickle Company					
Underground Storage Tanks		X			
Soil Piles		X			
NORTH KLONDIKE AREA					
X-401 Area	X		4/2/98	4/9/98	
X-401 Test Stand	O				
X-402 Test Stand	O				
X-403 Test Stand	O				
Equipment Shed	O				
Pavilion	O				
Locker Room	O				
Fire Training Area C		X			
X-401 Drywells		X			
X-401 Locker Room Septic System		X			
X-410 Area	X		3/31/98	4/9/98	
X-442 Storage Room	O				
X-196 Control Room	O				
X-410 Test Stand	O				
X-411 Test Stand	O				
X-412 Test Stand	O				
X-411 Control Room	O				
X-411 Compressor Room	O				
Maintenance and Storage Building	O				
X-410 Drain Pipe		X			
Maintenance and Storage Septic System		X			
X-410 Oil Rack		X		4/21/98	
X-415 Area	X		4/3/98	4/9/98	
X-415 Combustion Lab	O				
X-416 Test Stand	O				
X-417 Test Stand	O				
X-419 and X-420 Test Stands	O				
X-426 and X-427 Test Stands	O				
X-449 Test Stand	O				
X-450 Test Stand	O				
X-451 Test Stand	O				
Infra-Red Lab X-450	O				
X-415 Septic System and Drywell		X			
X-415 Boiler Room AST		X			
MERL Area	X		3/31/98	4/9/98	
MERL Exlosives Forming	O				
Control Room	O				
Storage Building	O				
Undesignated Building	O				
Fire Training Area D		X			
MERL Drywell		X			
Explosives Storage Area	X		4/2/98	4/9/98	
Outside Storage Area	O				
Fill Area		X			
Underground Storage Tank		X			
Explosives Storage Building		X			
Outside Chemical Storage Shed		X			
Chemical Storage Building		X			
North Klondike Undeveloped Land Area	X		4/3/98	4/9/98	
Undeveloped Land	O				
Outside Storage Area		X			
Soil Piles		X			
X-430 Area	X		3/31/98	4/9/98	
X-430 Test Stand	O				
X-431 Test Stand	O				
X-432 Test Stand	O				
X-433 Test Stand	O				
X-434 Test Stand	O				
X-435 Test Stand	O				
X-436 Test Stand	O				
Stainless Steel Tank		X			
Aboveground Storage Tank		X			
X-407 Area	X		3/31/98	4/9/98	
X-404 Test Stand	O				
X-405 Test Stand	O				

TABLE 1
ENVIRONMENTAL UNITS

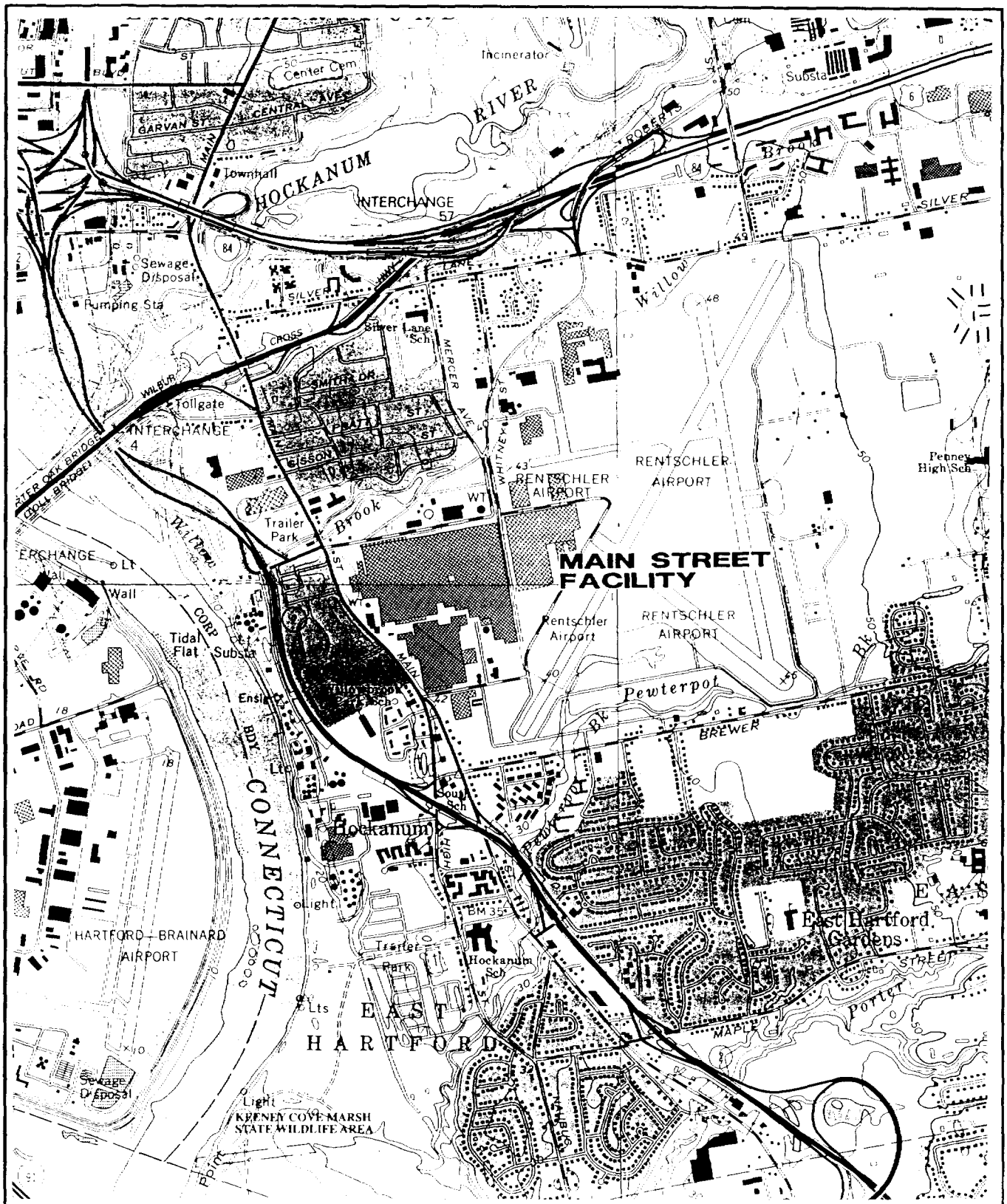
Airport/Klondike Area
Pratt & Whitney Main Street Facility

	AREA USTM	INDIVIDUAL USTM	DATE SUBMITTED	DATE REVIEWED	DATE REVISED
X-406 Test Stand	O				
X-407 Test Stand	O				
X-408 Test Stand	O				
X-408 Test Rig Room	O				
X-409 Test Stand	O				
North Klondike Fire Pump House	O				
Compressor Building	O				
PCB Storage Building		X			
X-194 (X-448) Area	X				
X-448 Test Stand	O				
Control Room	O				
Block House	O				
Outside Storage	O				
X-194 Area	O				
Aboveground Storage Tank		X			
X-312/X-314 Area	X		4/2/98	4/9/98	
X-312 Test Stand	O				
X-314Test Stand	O				
X-312 Tank Farm		X			
X-314 Septic System		X			
SOUTH KLONDIKE AREA					
Tie-Down Area	X		4/2/98	4/9/98	
X-309 Test Stand	O				
Fire Training Area A & B-24 Test Stand		X			
USTs and AST		X			
Firing Range Area					
Firing Range		X			
Former Linde Gas/Chemical Storage Building Area					
Former Linde Gas		X			
Linde Bldg, Fuel Oil UST, Load/Unload		X			
Drums and Dumpster Areas		X			
Former Underground Storage Tank		X			
Linde Septic System		X			
Cyrogenics	X				
South Klondike Fire Pump House	O				
Cryogenics Building	O				
Cryogenics Drywell & Septic System		X			
Underground Storage Tank		X			
Aboveground Storage Tank		X			
		X			
Virgin Products Storage Area					
Storage Area 2		X			
Storage Area 3		X			
Quonset Hut/Drum Storage Area		X			
X-307 Area	X		4/3/98	4/9/98	
Test Stand X-307	O				
X-307 Septic System		X			
X-307 Rubble Piles		X			
South Klondike Undeveloped Land Area	X		4/3/98	4/9/98	
Undeveloped Land	O				
Debris Piles		X			
SOUTH AIRPORT AREA					
Fire Training Area B					
Fire Training Area B		X			
Contractor Storage Area					
Contractor Storage Area		X			
Former Storage Area					
RCRA Waste Piles		X			
Tank Trailer Storage Area					
Tank Trailer Storage Area		X			
South Airport Fill Area					
Fill Area		X			

TABLE 2
STORAGE TANKS

Airport/Klondike Area
Pratt & Whitney Main Street Facility

	Volume (gallons)	Description	Quantity	Type
NORTH AIRPORT AREA				
Silver Lane Pickle Company	Unknown	Fuels	6	UST
NORTH KLONDIKE AREA				
X-401 Area	275	Fuel Oil	1	AST
	275	JP-4	1	AST
X-410 Area	500	JP-5	1	AST
	275	Fuel Oil	1	AST
	500	Fuel Oil	1	AST
X-415 Area	5000	#4 Fuel Oil	1	AST
MERL Area	500	Fuel Oil	1	AST
Explosives Storage Area	500	Fuel Oil	1	UST
X-430 Area	500	Fuel	1	AST
	2000	#2 Fuel Oil	1	AST
X-407 Area	275	Fuel Oil	1	AST
	275	JP-4	2	AST
X-194 (X-448) Area	1000	#2 Fuel Oil	1	AST
X-312/X-314 Area	3000	JP-4	3	UST
	5000	JP-4	2	UST
	15000	JP-5	1	UST
SOUTH KLONDIKE AREA				
Tie-Down Area	3000	JP-5	1	AST
Former Linde Gas/Chemical Storage Building Area	Unknown	Fuel	2	UST
Cyrogenics	275	Diesel	1	AST
	1000	#2 Fuel Oil	1	UST
Virgin Products Storage Area	275	Fuel	1	AST



MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY, AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

1000 0 1000 2000 3000

SCALE IN FEET

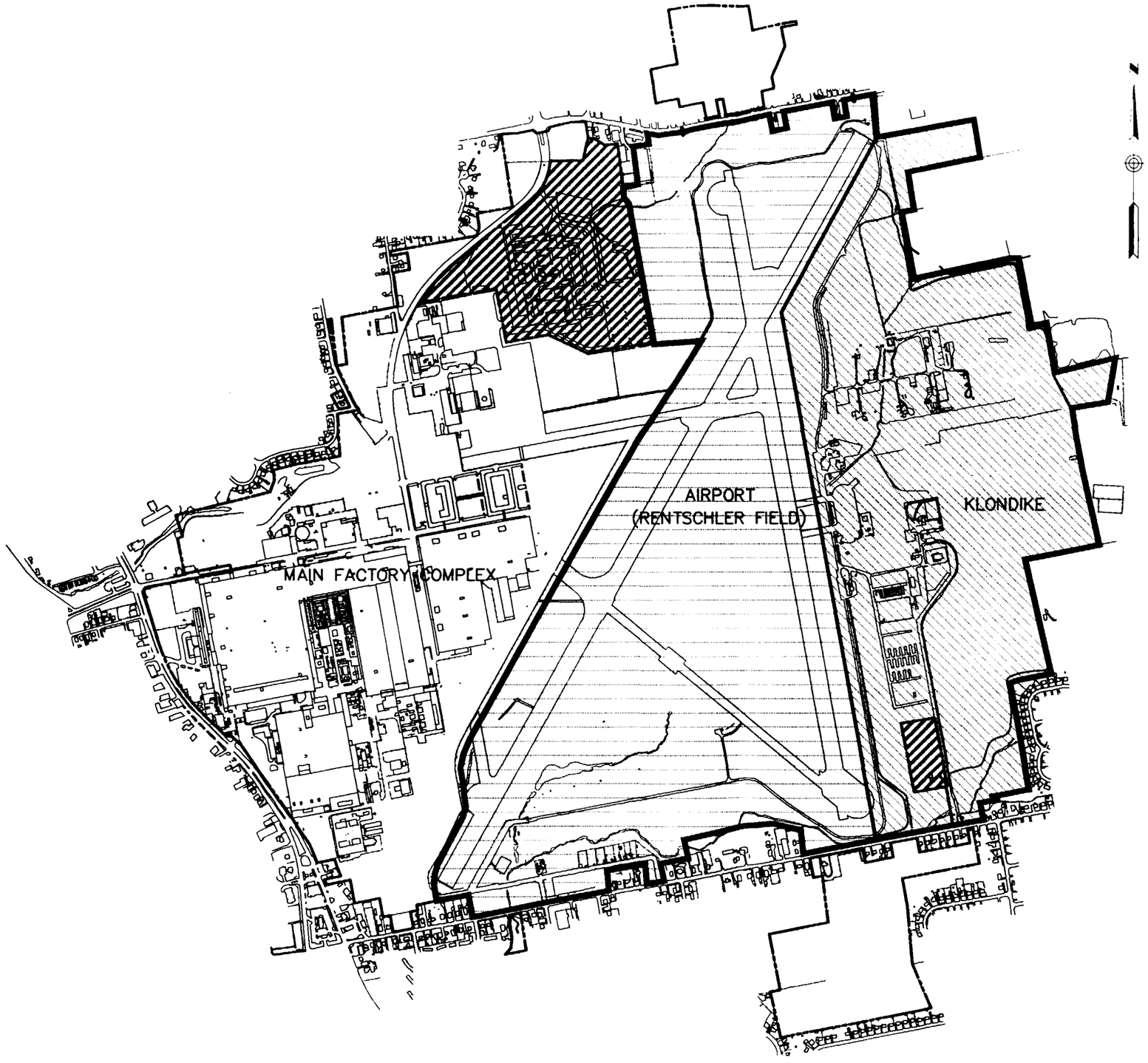
AIRPORT/KLONDIKE AREA

SUMMARY SITE INVESTIGATION AND REMEDIATION REPORT

PRATT & WHITNEY MAIN STREET FACILITY USGS TOPOGRAPHIC MAP

FIG. 1

Comm.No.		
68V8124	Pratt & Whitney, A United Technologies Company	LEA



LEGEND

- Property line (Approximate location)
- Site Area boundary (Approximate location)
- Airport Area (Rentschler Field)
- Klondike Area
- Areas which are not part of the East Hartford Main Street Facility

MAP REFERENCE:

SURVEY CONTROL BY FUSS & O'NEILL, INC
PHOTOGRAMMETRY BY GOLDEN AERIAL SURVEYS, INC
DATE OF PHOTOGRAPHY: 3/17/91

500 0 500 1000 1500

SCALE IN FEET

AIRPORT/KLONDIKE AREA

SUMMARY SITE INVESTIGATION AND REMEDIATION REPORT

PRATT & WHITNEY MAIN STREET FACILITY SITE PLAN

FIG.2

Comm.No. 68V8124

Pratt & Whitney
A United Technologies Company

LEA

68V8124F2 4/8/98

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Description of Oversized Material, if applicable:

DRAWING 1: SUMMARY SITE INVESTIGATION AND REMEDIATION REPORT, SITE LOCATION MAP & ENVIRONMENTAL UNITS

[X] Map [ ] Photograph [ ] Other (Specify Below)

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Facility ID#: CTD990672081

Phase Classification: R-5

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[ ] Page(s) Missing (Please Specify Below)

[ ] Privileged [ ] Other (Provide Purpose Below)

Description of Oversized Material, if applicable:

DRAWING 1: SUMMARY SITE INVESTIGATION AND REMEDIATION REPORT, GROUNDWATER SAMPLING LOCATION MAP

[X] Map [ ] Photograph [ ] Other (Specify Below)

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Description of Oversized Material, if applicable:

DRAWING 1: SUMMARY SITE INVESTIGATION AND REMEDIATION REPORT, SITE LOCATION MAP & ENVIRONMENTAL UNITS

[X] Map [ ] Photograph [ ] Other (Specify Below)

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